IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/616,457

Appellants: Manfred Herrmann ***Filed By EFS***

Filed: 07/09/2003 Confirmation No. 1034

Title: METHOD AND APPARATUS FOR THE INVESTIGATION OF A FUEL CELL SYSTEM

Art Unit: 1745

Examiner: O'Neill, Karie

Attorney Docket No. GP-301716 (7608.3031.001)

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APPEAL BRIEF

Sir:

On May 29, 2007, Appellants filed a Notice of Appeal of a Final Rejection in the Office Action of January 26, 2007. This appeal covers claims 1-25, 30-33 and 44-48 which are rejected on prior art grounds.

Please charge the requisite fee for filing this Appeal Brief to Deposit Account No 07-0960. Also, please charge any other required fees or credit any excess to Deposit Account No. 07-0960.

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I – Real Party In Interest

The real party in interest is General Motors Corporation.

II – Related Appeals and Interferences

There are no other related appeals or interferences.

III – Status of the Claims

Claims 1-25, 30-33 and 44-48 are pending.

Claims 1-25, 30-33 and 44-48 have been rejected.

Claims 26-29 and 34-43 have been canceled.

Claims 49-51 have been withdrawn by the Examiner.

There are no other claims.

IV – Status of the Amendments

Appellants' amendment after final was entered by the advisory action dated April 23, 2007. The attached claims reflect the enter amendment after final.

V – Summary of Claimed Subject Matter

Claim 1 is a method for the investigation of a fuel cell system. The fuel cell system has an anode side to which fuel is supplied in operation and a cathode side to which an oxidizing agent is supplied in operation. (Pg. 1, ln. 2-6). The fuel cell system has at least one fuel cell having an anode, a cathode, and a membrane separating the cathode from the anode. (Pg. 1, ln.

5-7). The method comprises a first test comprising at least one of the following tests: a) to test whether the fuel cell system is gas-tight at the anode side or the cathode side b) to test whether a leakage is present between the anode side and the cathode side c) to test a starting behavior of the fuel cell system d) to test an operation of the fuel cell system at low current yield. (Pg. 1, ln. 7-12).

The first test is carried out with a mixture of at least one inert gas with a fuel permissible for the operation of the fuel cell system. (Pg. 3, ln. 3-6). The mixture is supplied to the anode side of the fuel cell system. (Pg. 3, ln. 6-7; Pg. 9. ln. 12-14). The amount of fuel in the mixture is predetermined such that a proportion of the fuel present in the mixture lies below a value at which the mixture is flammable in air. (Pg. 3, ln. 6-9; Pg. 14, ln. 13-17). The tests are conducted outside of a test chamber. (Pg. 2, ln. 25-Pg. 3, ln. 9; Pg. 3, ln. 25-Pg. 4, ln. 14; Pg. 20, ln. 1-15).

Claim 3 depends from claim 1 and calls for a mixture that comprises substantially 95% N_2 and 5% H_2. (Pg. 4. ln. 26-27; Pg. 14, ln. 13-17).

Claim 4 depends from claim 1 and states the first test is carried out in an environment with a normal air atmosphere. (Pg. 3. ln. 25-30; Pg. 14, ln. 23-25).

Claim 5 depends from claim 1 and states the first test is carried out in an environment with normal ventilation. (Pg. 5, ln. 1-2).

Claim 6 depends from claim 1 and states that at least one of the tests a), b), c), or d) is carried out during or after manufacture of a vehicle incorporating the fuel cell system as a source of propulsion in order to test operability of the vehicle at the time of manufacture. (Pg. 5, ln. 2-8).

Claim 7 depends from claim 1 and states the first test is carried out in a workshop after repair of a vehicle containing the fuel cell system. (Pg. 5, ln. 5-8).

Claim 9 depends from claim 1 and states that at least one of the tests a), b), c), or d) is carried out on a test bed during development of the fuel cell system. (Pg. 5. ln. 12-14).

Claim 11 depends from claim 1 and states that the fuel cell system comprises at least first and second inlets and at least first and second outlets. (Pg. 5, ln. 17-24; Fig. 1). During the carrying out of the first test a), the mixture is filled at a predetermined test pressure into the fuel cell system through one of the inlets and outlets. (Pg. 5, ln. 17-21). There is simultaneous, previous, or subsequent closing of further ones of the inlets or outlets out of which an exit of the mixture could take place. (Pg. 5, ln. 21-24). A measurement is made to determine whether the test pressure reduces impermissibly as a function of time. (Pg. 5, ln. 21-24; Pg. 15, ln. 25-28).

Claim 13 depends from claim 47 and calls for a fuel cell system comprising at least first and second inlets and at least first and second outlets as well as a plurality of valves. (Pg. 5, ln. 25- Pg. 6, ln. 5; Fig. 1). At least one valve is associated with each inlet and outlet. (Pg. 5, ln. 25- Pg. 6, ln. 5; Fig. 1). Lines are present which communicate with the valves. (Pg. 5, ln. 25- Pg. 6, ln. 5; Fig. 1).

A quantity of mixture is fed into the fuel cell system and measured (Pg. 5, ln. 25-26). The valves are switched on or off in accordance with at least one of a predetermined pattern and a predetermined sequence. (Pg. 5, ln. 26-29). A measurement is made of a quantity of the mixture emerging from at least some of the lines. (Pg. 5. ln. 29-30). A sum is formed of the emerging quantities and is compared with the fed-in quantity to determine any leakages, which appear as a difference in value. (Pg. 5, ln. 30-Pg. 6, ln. 2).

Claim 30 depends from claim 1 and states that after a successfully concluded test with the mixture, a proportion of fuel in the mixture is increased and a second test is carried out in the same manner as the first test. (Pg. 15, ln. 12-17; Pg. 17, ln. 4-9).

Claim 31 depends from claim 30 and states that the second test is carried out to determine whether a higher power yield of the fuel cell system can be achieved with a significantly reduced proportion of inert gas in the mixture. (Pg. 8, ln. 15-17).

Claim 32 depends from claim 30 and states that the second test is carried out to determine whether a full power yield of the fuel cell system can be achieved with a degenerated mixture without inert gas. (Pg. 8, ln. 15-17).

Claim 33 depends from claim 47 and states that at least one of a fuel sensor and an inert gas sensor is used in order to determine any leakages of the mixture. (Pg. 8, ln. 18-20; Pg. 14, ln. 21-Pg. 15, ln. 16).

Claim 44 depends from claim 1 and calls for an inert gas that comprises nitrogen and a fuel that comprises hydrogen. (Pg. 13, ln. 20-22). This claim further calls for supplying the mixture from a mixture tank. (Pg. 13, ln. 22-24).

Claim 46 depends from claim 1 and states that the method is carried out without a test chamber. (Pg. 2. ln. 25-Pg. 3, ln. 2).

Claim 47 is an independent claim to a method for the investigation of a fuel cell system. It is identical to claim 1 in all aspects except for the additional limitation that the mixture comprises substantially 5% fuel and 95% inert gas. (Pg. 14, ln. 13-17).

VI – Grounds of Rejection to be Reviewed on Appeal

VII. A. Whether claims 1-3, 10, 13-14 and 46-48 are unpatentable under 35 U.S.C. 102(e) as being anticipated by Condit et al (U.S. Patent No. 6,635,370)

VII.B. Whether claims 1, 7-8, 10, 22-25 and 44-46 are unpatentable under 35 U.S.C. 102(e) as being anticipated by Bailey et al (U.S. Patent No. 6,638,650)

VII. C. Whether claims 4-5 and 11-12 are unpatentable under 35 U.S.C. 103(a) over Bailey et al (U.S. Patent No. 6,638,650) and further in view of Knights et al (U.S. Patent No. 6,492,043)

VII. D. Whether claims 6-7, 9, 18-21, 30-32 and 46 are unpatentable under 35 U.S.C. 103(a) as being unpatentable over Condit et al, or over Bailey et al

VII. E. Whether claim 15 is unpatentable under 35 U.S.C. 103(a) over Condit et al, and further in view of Bailey et al.

VII. F. Whether claims 16-17 are unpatentable under 35 U.S.C. 103(a) over Condit et al, or over Bailey et al, and further in view of Tomimatsu et al (U.S. Patent No. 5,595,832)

VII. G. Whether claim 33 is unpatentable under 35 U.S.C. 103(a) over Condit et al (U.S. 6,635,370), or over Bailey et al (U.S. 6,638,650), and further in view of Meltser et al (U.S. 5,763,113)

VII – Argument

VII. A. Whether claims 1-3, 10, 13-14 and 46-48 are unpatentable under 35 U.S.C. 102(e) as being anticipated by Condit et al (U.S. Patent No. 6,635,370)

SILENCE OF A REFERENCE DOES NOT SUPPORT ANTICIPATION BY INHERENCY REJECTION

Claims 1-3, 10, 13-14 and 46-48 have been rejected under 35 U.S.C. 102(e) as being anticipated by Condit et al (U.S. Patent No. 6,635,370). However, the support for the Examiner's rejection of claim 1 completely ignores the limitations "and wherein said tests are conducted outside of a test chamber." Condit et al does not disclose the ignored limitation. At page 5 of the Office Action of January 26, 2007, the Examiner states:

> Condit et al, do not specifically point out that the tests are conducted outside of a test chamber, however, it is the Examiner's position that a reference that is silent about a claimed invention's features is inherently anticipated if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. In re Robertson, 49 USPQ 2d 1949 (1999).

The Examiner admits that the limitation "and wherein said tests are conducted outside of a test chamber" is not disclosed by Condit et al. The Examiner's position regarding inherency is drastically misplaced. The fact that a certain result or characteristic **may** result or be present in the prior art is not sufficient to establish inherency. In re Rijckaert, 28 USPQ 2d 1955, 1957 (Fed. Cir.1993). In the instant case, the issue is not whether a claimed structural (or act of a process) element disclosed in the prior art has an inherent property or characteristic as further set forth in the claim. The issue is whether the reference discloses at all, the claimed element, i.e., that the "tests are conducted outside of a test chamber." Silence of the reference as to where the test are conducted can not support a position of anticipation by inherency rejection. Testing using explosive gases is conducted in test chambers by those skilled in the art consistent with government regulations addressing the same. The burden on the Examiner to establish anticipation by inherency is set forth as follows:

> In relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teaching of the applied prior art. Ex parte Levy, 17 USPQ 2d, 1461, 1464 (BOPAI 1999).

Appellant maintains that by following Condit et al, one would not necessarily be led to conduct a test outside of a test chamber. Therefore, no prima facie case of anticipation by inherency has not been established. Withdrawal of the rejection is respectfully requested.

Claim 3 is separately patentable. With respect to claim 3, again, Appellant directs the Board's attention to Condit et al which teaches that it is preferred that the hydrogen concentration of less than 4% be used "since more than 4% hydrogen in air is considered in excess of the flammability limit." Thus, Condit et al does not teach a mixture comprising substantially 95% nitrogen and 5% hydrogen as recited in claim 3.

Claims 13-14 are separately patentable. With respect to the rejection of claims 13-14, the Examiner's basis in support of the rejection completely ignores the claim limitation that "a measurement is made of a quantity of said mixture emerging from at least some of the lines, a sum is formed of the emerging quantities and is compared with fed-in quantities to determine leakage." Although the Examiner cites column 8, lines 26-24 as disclosing such limitation, Condit et al simply does not disclose the limitation and the Examiner is respectfully requested to quote verbatim portions of Condit et al that disclose the same or withdraw the rejection. No prima facie case of anticipation has been established with respect to claims 13-14.

With respect to the rejection of independent claim 47 and claim 48 that depends therefrom, the Examiner supported his position again noting that Condit et al does not specifically point out that tests are conducted outside of a test chamber but maintains that the claimed invention's feature is inherently anticipated. Appellant's remarks above regarding an anticipation are repeated and applied to independent claim 47. Following Condit et al would not necessarily result in the tests being conducted outside of a test chamber. No prima facie case of anticipation has been established with respect to claims 47-48.

VII.B. Whether claims 1, 7-8, 10, 22-25 and 44-46 are unpatentable under 35 U.S.C. 102(e) as being anticipated by Bailey et al (U.S. Patent No. 6,638,650).

Claims 1, 7-8, 10, 22-25 and 44-46 were rejected under 35 U.S.C. 102(e) as being anticipated by Bailey et al (U.S. Patent No. 6,638,650). However, again, the rejection completely ignores the limitation "and wherein said tests are conducted outside of a test chamber." The Examiner fails to point to any specific section of Bailey et al in support of the

reference disclosing the cited limitation. No prima facie case of anticipation has been established.

With respect to the rejection of claims 7-8, although Bailey discloses that it is typical to check for leaks prior to operating the fuel cell, Bailey doesn't disclose a method in which such leaks may be checked for involving tests that are conducted outside of a test chamber as recited in independent claims 1 and 47.

Claim 44 is separately patentable. With respect to the rejection of claims 44-46, Bailey et al fails to disclose "supplying said mixture from a mixture tank" as recited in claim 44. Contrary to the Examiner's position, Bailey, at column 17, lines 18-25, does not disclose the recited limitation. A single source of fuel mixture, including 5% hydrogen and 95% nitrogen is available for use in testing, thus making Appellant's invention convenient for use in testing of fuel cells during manufacturing or repair and the like. Bailey fails to suggest using a mixture from such a source. No prima facie case of anticipation has been established with respect to claim 44.

VII. C. Whether claims 4-5 and 11-12 are unpatentable under 35 U.S.C. 103(a) over Bailey et al (U.S. Patent No. 6,638,650) and further in view of Knights et al (U.S. Patent No. 6,492,043)

KNIGHTS ET AL TEACHES AWAY FROM THE INVENTION

Claims 4-5 and 11-12 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Bailey et al (U.S. Patent No. 6,638,650) as applied to claims 1, 8, 10, 22-25 and 44-66 and further in view of Knights et al (U.S. Patent No. 6,492,043). The Examiner, at

page 7, paragraph 7 of the final office action dated January 26, 2007, admits that Bailey et al does not disclose the first test being carried out in an environment with normal air atmosphere or an environment with normal ventilation and therefore the limitation "and wherein the tests are conducted outside of a test chamber" in independent claims 1 and 47 would not have been identically disclosed by Bailey.

The Examiner admits that Bailey does not disclose that the first test should be carried out in an environment with a normal air atmosphere as recited in claim 4, or an environment with normal ventilation as recited in claim 5. The Examiner then refers to Knights et al and relies on column 8, lines 24-26 which state:

> To detect external leaks between a fuel cell fluid passage and the external environment, the monitored environment may be the surrounding environment outside the fuel cell.

The Examiner then concludes that it would have been obvious to a person of ordinary skill in the art to test the Bailey reference in an environment suggested by Knights et al because Knights teaches that the environment outside the fuel cell would be a normal air atmosphere and have proper ventilation. However, the above reference section of Knights clearly does not teach anything about the outside environment of the fuel cell. The outside of the environment of the fuel cell might be and can be inferred to be a testing chamber. Knights et al does not suggest testing a fuel cell outside of a testing chamber. Nor does Knights et al suggest the use of a fuel mixture including an amount of fuel which is less than a value at which said mixture is flammable in air as recited in independent claims 1 and 47.

The Board's attention is respectfully directed to Knights et al Figure 6 and column 13, lines 17-20 which teach that the fuel cell stack should be enclosed inside of a chamber and under

a vacuum. As such, Knights et al actually teaches away from Appellant's claimed invention. Thus, no prima facie case of obviousness has been established with respect to claims 4-5.

Claim 11 is separately patentable. With respect to the rejection of claims 11 and 12, the Examiner admits that the references are silent as to the requirement of filling a fuel cell at a predetermined pressure and thereafter measuring the pressure over time and comparing it to the predetermined pressure to determine if the test pressure has reduced impermissibly as a function of time. Thus, claim 11 is directed to a method of investigating a fuel cell comprising a first test to test whether the fuel cell is gas tight including filling the fuel cell at a predetermined pressure and measuring pressure as a function of time. The limitations of claim 11 have been ignored. Because the rejection ignores claim limitations, no prima facie case of obviousness has been established with respect to claims 11 and 12.

VII. D. Whether claims 6-7, 9, 18-21, 30-32 and 46 are unpatentable under 35 U.S.C. 103(a) over Condit et al, or over Bailey et al

NUMEROUS CLAIM LIMITATIONS HAVE BEEN IGNORED

Claims 6-7, 9, 18-21, 30-32 and 46 were rejected under 35 U.S.C. 103(a) as being unpatentable over Condit et al, as applied to claims 1-3, 10, 13-14 and 46-48 as set forth above, or over Bailey et al as applied to claims 1, 8, 10, 22-25 and 44-46 as set forth above. However, the Examiner admits that the references do not disclose at least one of the tests being carried out during the manufacturing of a vehicle incorporating said fuel cell as a source of propulsion in order to test operability of said vehicle at time of manufacture, wherein the first test is carried out in a workshop after repair of a vehicle containing said fuel system or wherein at least one of the

tests is carried out on a test bench during development of said fuel cell system and the test being carried out without a test chamber. The Examiner then concludes that it would have been obvious to a person of ordinary skill in the art to perform these method steps in any order since it can be held that the selection in which the process steps are carried out has little patentable weight when not distinctly claimed. However, Appellant respectfully points out that Appellant is not claiming any particular order but a test that may be selected from four (a-d) possibilities that the Examiner has recognized the references as not disclosing or suggesting.

With respect to claim 6, neither Condit et al nor Bailey et al disclose that the amount of fuel in the mixture supplied to the anode should be present in an amount such that the mixture lies below the value at which the mixture is flammable in air so that the tests can be conducted outside of a test chamber. Consequently, as recited in claim 6, such an arrangement allows for at least one of the tests a), b), c) or d) to be carried out during the manufacture of a vehicle in order to test operability of the vehicle at time of manufacture. Because no special test chamber is required, such a test can be conducted in the manufacturing plant and by laborers that do not have a formal education. Dependent claims 7, 9, 18-21, 30-32 and 46 are believed to be patentable on the same basis as independent claim 1. Therefore, no prima facie case of obviousness has been established with respect to claims 6-7, 9 and 46.

Claims 30-32 are separately patentable. With respect to the rejection of claims 30-32, the Examiner admits that neither reference discloses that after a successfully conducted test, a second test is carried out in the same manner as the first. The Examiner concludes that it would have been obvious to conduct a second test to verify the accuracy of the first test. However, the Examiner fails to point to any reference suggesting the same. Thus, no prima facie case of obviousness has been established with respect to claims 30-32.

Further, with respect to claim 30, the rejection completely ignores the recitation "a portion of the fuel in said mixture is increased and a second test is carried out in the same manner as the first test". The Examiner has not pointed to any reference suggested increasing the amount of fuel in the mixture. Further, with respect to claim 31, the rejection ignores the limitation "said second test is carried out ... with a significantly reduced portion of inert gas in the mixture." Still further, with respect to claim 32, the rejection ignores the limitations "said second test is carried out ... with a degenerated mixture without inert gas." Since claim limitations have been completely ignored, no prima facie case of obviousness has been established.

VII. E. Whether claim 15 is unpatentable under 35 U.S.C. 103(a) over Condit et al, and further in view of Bailey et al.

Claim 15 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Condit et al, as applied to claims 1-3, 10, 13-14 and 46-48 above, and further in view of Bailey et al. However, claim 15 depends from claim 13 which requires "wherein a quantity of said mixture is fed into said fuel cell system, said quantity of said mixture is measured, said valves are switched on or off in accordance with at least one of a predetermined pattern in a predetermined sequence, a measurement is made of a quantity of said mixture emerging from at least some of said lines, a sum is formed of said emerging quantities and is compared with said fed-in quantity to determine any leakage, which appear as a difference value." Although the Examiner points to Bailey et al, column 9, lines 10-15 and 24-33 to support the rejection, Bailey et al doesn't measure the amount of gas entering and leaving the fuel cell system. No prima facie case of obviousness has been established.

VII. F. Whether claims 16-17 are unpatentable under 35 U.S.C. 103(a) over Condit et al, or over Bailey et al, and further in view of Tomimatsu et al (U.S. Patent No. 5,595,832)

Claims 16-17 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Condit et al, as applied to claims 1-3, 10, 13-14 and 46-48 as described above, or over Bailey et al, as applied to claims 1, 8, 10, 22-25 and 44-46 as described above, and further in view of Tomimatsu et al (U.S. Patent No. 5,595,832). Claims 16-17 each depend from independent claim 1 and are patentable on the same basis. Neither Condit, Bailey et al, or Tomimatsu et al disclose or suggest that a fuel cell system should be investigated utilizing a fuel mixture including an amount of fuel below that at which the mixture is flammable in air and that the test should be conducted outside of a test chamber. No prima facie case of obviousness has been established.

VII. G. Whether claim 33 is unpatentable under 35 U.S.C. 103(a) over Condit et al (U.S. 6,635,370), or over Bailey et al (U.S. 6,638,650), and further in view of Meltser et al (U.S. 5,763,113)

MELTSER ET AL ACTUALLY TEACHES AWAY FROM THE CLAIMED INVENTION

Claim 33 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Condit et al (U.S. 6,635,370), as applied to claims 1-3, 10 and 13-14 above, or over Bailey et al (U.S. 6,638,650), as applied to claims 1, 8, 10, 13-15, 22-25 and 44-45 above, and further in view of Meltser et al (U.S. 5,763,113). However, neither Condit et al, Bailey et al nor Meltser et al, individually or in combination, suggest a method of investigating a fuel cell system including a first test being carried out with a mixture of at least one inert gas and a fuel wherein the mixture

is supplied to the anode side of the fuel cell system and the amount of fuel in the mixture is such that the mixture lies below the value at which the mixture is flammable in air and wherein the tests are conducted outside of a test chamber as recited in claim 33. The Borad's attention is respectfully directed to Meltser et al column 3, line 65 – column 4, line 2, wherein Meltser et al teach a cathode flow channel being provided adjacent the cathode for flowing oxygen-rich gas (i.e., preferably air) by and into contact with the cathode, and similarly an anode flow channel provided adjacent the anode for flowing hydrogen fuel by and into contact with the anode. Because Meltser et al makes a distinction with respect to the oxidant as being oxygen-rich, but no such distinction is made with respect to the hydrogen fuel, the inference a person of ordinary skill in the art would draw from the reference is that pure hydrogen is supplied to the anode. As such, Meltser et al actually teaches away from Appellant's claimed invention.

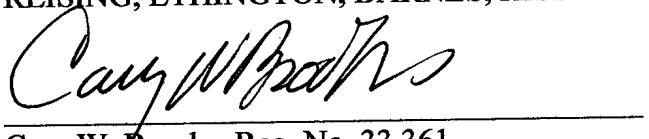
CONCLUSION

The rejection of Appellant's claims is based on numerous errors including, but not limited to, the uses of silence of a reference to improperly support an anticipation by inherency rejection; rejections fail to address the teaches away effect of Knights et al; numerous claim limitations have been ignored is several rejections; and rejections fail to address the teaches away effect of Meltser et al.

In view of the above Arguments, Appellant respectfully request the Board to reverse all of the rejections.

Respectfully submitted,

REISING, ETHINGTON, BARNES, KISSELLE, P.C.



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Dated: August 14, 2007

VIII – Claims Appendix

1. (Previously Presented) A method for the investigation of a fuel cell system, said fuel cell system having an anode side to which a fuel is supplied in operation and a cathode side to which an oxidizing agent is supplied in operation and comprising at least one fuel cell, each said fuel cell having an anode, a cathode and a membrane separating said cathode from said anode, said method comprising a first test comprising at least one of the following tests:

a) to test whether said fuel cell system is gas-tight at said anode side and/or at said cathode side,

b) to test whether a leakage is present between said anode side and said cathode side,

c) to test a starting behaviour of said fuel cell system, or

d) to test an operation of said fuel cell system at low current yield,

said first test being carried out with a mixture of at least one inert gas with a fuel permissible for the operation of said fuel cell system, said mixture being supplied to said anode side of said fuel cell system and the amount of fuel in the mixture being predetermined such that a proportion of said fuel present in said mixture lies below a value at which said mixture is flammable in air, and wherein said tests are conducted outside of a test chamber.

2. (Previously presented) A method in accordance with claim 1, wherein said mixture includes less than 5.7 vol.-% hydrogen.

3. (Previously Presented) A method in accordance with claim 1, wherein the mixture comprises substantially 95% N_2 and 5% H_2.

4. (Previously Presented) A method in accordance with claim 1, wherein the first test is carried out in an environment with a normal air atmosphere.

5. (Previously Presented) A method in accordance with claim 1, wherein the first test is carried out in an environment with normal ventilation.

6. (Previously Presented) A method in accordance with claim 1, wherein at least one of said tests a), b), c) or d) is carried out during or after manufacture of a vehicle incorporating said fuel cell system as a source of propulsion in order to test operability of said vehicle at a time of manufacture.

7. (Previously Presented) A method in accordance with claim 1, wherein the first test is carried out in a workshop after repair of a vehicle containing said fuel cell system.

8. (Previously Presented) A method in accordance with claim 1, in which said fuel cell system is present as a module, at least one of said tests a), b), c) or d) being carried out during or after the manufacture of said module prior to the installation of said module in one of a vehicle and an installation.

9. (Previously Presented) A method in accordance with claim 1, at least one of said tests a), b), c) or d) being carried out on a test bed during development of said fuel cell system.

10. (Previously Presented) A method in accordance with claim 1, wherein a plurality of fuel cells are combined together to form said fuel cell system in the form of a fuel cell stack and at least one of said first test a), b), c) or d) is carried out at said fuel cell stack.

11. (Previously Presented) A method in accordance with claim 1, said fuel cell system comprising at least first and second inlets and at least first and second outlets wherein, during the carrying out of the first test a), said mixture is filled at a predetermined test pressure into said fuel cell system through one of said inlets and outlets, with simultaneous, previous or subsequent closing of further ones of said inlets and said outlets out of which an exit of said mixture could take place and wherein a measurement is made whether said test pressure reduces impermissibly as a function of time.

12. (Previously Presented) A method in accordance with claim 11 wherein said predetermined test pressure is approximately twice the operating pressure of the fuel cell.

13. (Previously Presented) A method in accordance with claim 47, said fuel cell system comprising at least first and second inlets and at least first and second outlets as well as a

plurality of valves at least one of which is associated with each said inlet and outlet, there being lines communicating with said valves, wherein a quantity of said mixture is fed into said fuel cell system, said quantity of said mixture is measured, said valves are switched on or off in accordance with at least one of a predetermined pattern and a predetermined sequence, a measurement is made of a quantity of said mixture emerging from at least some of said lines, a sum is formed of said emerging quantities and is compared with said fed-in quantity to determine any leakages, which appear as a difference value.

14. (Original) A method in accordance with claim 13 wherein at least one said valve is a regulatable valve which can be switched on and off.

15. (Original) A method in accordance with claim 13, wherein a development in time of said difference value is compared with said predetermined pattern in order to associate any eventually present leakage with a leakage source or a plurality of leakage sources.

16. (Original) A method in accordance with claim 1, wherein said fuel cell system is heated to one of an operating temperature and a maximum permissible excess temperature during the carrying out of any one of said tests.

17. (Original) A method in accordance with claim 1, wherein said fuel cell system is heated to one of an operating temperature and a maximum permissible excess temperature prior to the carrying out of any one of said tests.

18. (Original) A method in accordance with claim 1, wherein, during development of said fuel cell system, at least one of said tests is carried out as a long term test.

19. (Original) A method in accordance with claim 18, said fuel cell system including a plurality of valves which can be switched on and off wherein said long term test includes a plurality of switching on or switching off processes of said valves which can be switched on and off.

20. (Original) A method in accordance with claim 19, said fuel cell system further including at least one regulating valve having at least one set value, wherein said long term test also includes changes of said set value.

21. (Original) A method in accordance with claim 18, wherein said long term test includes a plurality of heating up and cooling down cycles of said fuel cell system.

22. (Original) A method in accordance with claim 1, wherein an association is developed between an electrical power generated by said fuel cell system when supplying a predetermined quantity of said mixture to said fuel cell system and an actual power yield of said fuel cell system when supplying an actual quantity of fuel in operation at at least one preset operating point, with a check being made whether said electrical power generated during said

supply of said predetermined quantity of said mixture corresponds to an expected power yield for said predetermined quantity of said mixture, from which a conclusion is drawn whether, in operation, with supply of said actual quantity of fuel, said actual power yield can be expected at said at least one preset operating point.

23. (Original) A method in accordance with claim 1, wherein an association is developed between an electrical power generated by said fuel cell system when supplying a predetermined quantity of said mixture to said fuel cell system and an actual power yield of another fuel cell system of the same kind when supplying an actual quantity of fuel in operation at at least one present operating point, with a check being made whether said electrical power generated during said supply of said predetermined quantity of said mixture corresponds to an expected power yield for said predetermined quantity of said mixture, from which a conclusion is drawn whether, in operation, with supply of said actual quantity of fuel, said actual power yield an be expected at said at least one preset operating point.

24. (Original) A method in accordance with claim 22, wherein said association is examined for various supplied quantities of said mixture and an investigation is made whether corresponding values of said electrical power generated permit a conclusion that said fuel cell system will work in operation at corresponding operating points with different actual quantities of fuel being supplied.

25. (Original) A method in accordance with claim 23, wherein said association is examined for various supplied quantities of said mixture and an investigation is made whether corresponding values of said electrical power generated permit a conclusion that said fuel cell system will work in operation at corresponding operating points with different actual quantities of fuel being supplied.

26. (Canceled)

27. (Canceled)

28. (Canceled)

29. (Canceled)

30. (Previously Presented) A method in accordance with claim 1, wherein, after a successfully concluded test with said mixture a proportion of fuel in said mixture is increased and a second test is carried out in the same manner as the first test.

31. (Previously Presented) A method in accordance with claim 30, wherein said second test is carried out to determine whether a higher power yield of the fuel cell system can be achieved with a significantly reduced proportion of inert gas in said mixture.

32. (Previously Presented) A method in accordance with claim 30, wherein said second test is carried out to determine whether a full power yield of said fuel cell system can be achieved with a degenerated mixture without inert gas.

33. (Previously Presented) A method in accordance with claim 47, wherein at least one of a fuel sensor and an inert gas sensor is used in order to determine any leakages of said mixture.

34. (Canceled)

35. (Canceled)

36. (Canceled)

37. (Canceled)

38. (Canceled)

39. (Canceled)

40. (Canceled)

41. (Canceled)

42. (Canceled)

43. (Canceled)

44. (Previously Presented) A method as set forth in claim 1 wherein the inert gas comprises nitrogen and the fuel comprises hydrogen; and further comprising supplying said mixture from a mixture tank.

45. (Previously Presented) A method as set forth in claim 1 wherein the inert gas comprises nitrogen and the fuel comprises hydrogen, and further comprising supplying said mixture comprising controlling the flow of hydrogen and nitrogen from separate sources.

46. (Previously Presented) A method as set forth in claim 1 carried out without a test chamber.

47. (Previously Presented) A method for the investigation of a fuel cell system, said fuel cell system having an anode side to which a fuel is supplied in operation and a cathode side to which an oxidizing agent is supplied in operation and comprising at least one fuel cell, each said fuel cell having ~~a~~ an anode, a cathode and a membrane separating said cathode from said anode, said method comprising a first test comprising at least one of the following tests:

a) to test whether said fuel cell system is gas-tight at said anode side and/or at said cathode side,

b) to test whether a leakage is present between said anode side and said cathode side,

c) to test a starting behaviour of said fuel cell system, or

d) to test an operation of said fuel cell system at low current yield,

said first test being carried out with a mixture of at least one inert gas with a fuel permissible for the operation of said fuel cell system, said mixture being supplied to said anode side of said fuel cell system and the amount of fuel in the mixture being predetermined such that a proportion of said fuel present in said mixture lies below a value at which said mixture is flammable in air, and wherein said tests are conducted outside of a test chamber wherein the mixture comprises substantially 5% fuel and 95% inert gas.

48. (Previously Presented) A method as set forth in claim 47 wherein the fuel is hydrogen and the inert gas is nitrogen.

IX – Evidence Appendix

None

X – Related Proceedings Appendix

None